IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION OF

PRIL et al.

Appln. No.: 09/899,566

Filed: July 6, 2001

Confirmation No.: 1633

Group Art Unit: 2851

Examiner: Fuller, Rodney Evan

Title: LITHOGRAPHIC PROJECTION APPARATUS, DEVICE MANUFACTURING METHOD, DEVICE MANUFACTURED THEREBY AND GAS COMPOSITION

June 30, 2003

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DECLARATION UNDER 37 C.F.R. 1.132

1. I, Bert van de Pasch, hereby attest as follows:
2. I am a joint inventor of the above-identified U.S. Patent Application Serial No. 09/899,566 entitled "Lithographic Projection Apparatus, Device Manufacturing Method, Device Manufactured Thereby and Gas Composition" (the '566 application).
3. I am currently employed by ASML Netherlands B.V. of the Netherlands, the assignee of the '566 application.
4. My current position is system engineer, and I am responsible for position measurement interferometry. I have held this position since 1995.
5. In total I have been involved with the development of lithographic devices for 13 years.
6. As an inventor, I am very familiar with the technology disclosed by the '566 application.
7. Independent claim 1 recites a lithographic projection apparatus which includes a displacement measuring interferometer and a purge gas into a space, to displace therefrom ambient air. The purge gas has a refractive index at a wavelength λ_1 which is substantially the same as that of air when measured at equal wavelength, temperature and pressure.
8. As would be well understood by a person of ordinary skill in the art, the required accuracy level of interferometric measuring means for microphotolithography is smaller than 10 nm, with a tendency to lower values, especially for lithographic systems using exposure wavelengths smaller than 180 nm (as recited in paragraph [0032] of the '566 application). Additionally, purge gas can influence the refractive

index of air in the interferometric displacement measuring beam over the whole length or a fraction of that.

9. The difference in refractive index of air and the refractive index of a purge gas can be expressed as

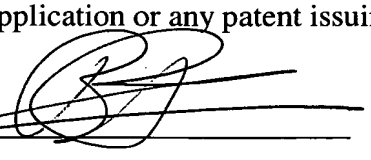
$$dn = (n\_purgegas)-(n\_air)$$

The difference in the displacement length dL, of the interferometric measurement path length (L), as a result of the change in refractive index can then be expressed as

$$dL = L*dn*rho$$

where rho is the air replacement factor. Rho would be equal to 1 if the air was entirely replaced with a purge gas and rho would by equal to 0 if there was no replacement of the air.

10. Accordingly, the difference, *dn*, between the refractive index of air and the refractive index of nitrogen, which is the purge gas used in Miyaji et al. (U.S. Patent No. 5,559,584) is $5* 10^{-6}$. Using typical values for rho and L, 0.01 and 0.5 meters, respectively, the difference in measured displacement, dL, is 25 nm.
11. This difference is 2.5 times larger than the 10 nm of required accuracy of the device of the present invention.
12. Therefore, a person or ordinary skill in the art of lithographic devices would understand that the refractive index of nitrogen is not substantially the same as that of air as alleged in the Office Action of January 30, 2003. In fact, the difference in the refractive indices of air and nitrogen are substantially different in the context of the field of lithographic devices.
13. All statements made of my own knowledge are true and all statements made on information and belief are believed to be true. I acknowledge that willful false statements and the like are punishable by fine, imprisonment, or both under 18 U.S.C. §1001 and may jeopardize the validity of the application or any patent issuing thereon.

By: 

Bert van de Pasch

Date: 26 June 2003